REMARKS

The subject invention relates to improvements in optical coherence domain reflectometry. In a first set of embodiments as illustrated in Figures 6a to 6c, a three port polarizing beam splitter 614 is used in conjunction with a separate, non-polarizing beam splitter 618 to direct polarized light to the sample and reference arms. In addition, a polarization manipulator (e.g. faraday rotator 634, 646) is provided for rotating the polarization state of the light waves in the sample and reference arms.

In a second set of embodiments as illustrated in Figure 7a and 7b, a four port polarizing beam splitter 714 is used which functions to divide the light along the sample and reference arms and combine the returned reflected light. The reflected light passing out of port IV of the polarizing beam splitter 714 exists in two orthogonal polarization states. In order to extract the interference signal between these two polarized light waves, it is necessary to include an additional polarizer which is oriented in a manner to mix the polarization states of the beams.

In one arrangement, the extra polarizer is a polarizing beam splitter 752a which directs the light to two separate detectors for detection. In this case, the azimuthal orientation of the polarizer is preferably set at 45 degrees with respect to the polarizing beam splitter 714 for balanced detection. In another arrangement (inset to Figure 7A), a linear polarizer 754a directs the light to a single detector. In this embodiment, the azimuthal orientation of the polarizer is preferably set at something other than 45 degrees with respect to the polarizing beam splitter 714 in order to reduce noise, e.g. by permitting more light from the sample arm to reach the detector as compared to light from the reference arm. A detailed description of these extra polarizers appears in the specification on page 29, line 26 to page 31, line 16. Some of the pending claims have been amended to include this second polarizer in order to better distinguish over the cited prior art.

Turning to the Office Action, the Examiner noted a number of objections to the claims. Most of the claims have been amended in accordance with the helpful suggestions of the Examiner. With regard to claim 20, in the Figure 6 embodiment, the non-polarizing beam splitter functions to combine the light from the reference and sample arms and guide the light back to the polarizing beam splitter. With regard to claim 74, the phrase "in their respective sample and reference paths" has been moved to make the claim more clear. In the Office Action, the Examiner rejected claim 56. Claim 56 has been cancelled. New claims 76 and 77 have been

added to replace claim 56 and address the objections of the Examiner. It is believed that the rejections and objections related to the form of the claim have been addressed.

In the Office Action, the Examiner indicated that claims 1 to 22, 44 to 61, 63 to 68 and 70 to 75 contained allowable subject matter. In response, applicant has amended claim 43 with the subject matter of claim 44 and amended claim 69 with the subject matter of claim 70. It is believed that these amendments place claims 43 to 75 in condition for allowance. This would leave only independent claims 23 and 42 as being rejected under the prior art.

Claims 23 and 42 are directed to the embodiments of Figure 7. As noted above, in this set of embodiments, a second polarizer 752 (or 754) is provided which is azimuthally oriented in a manner to permit extraction of an interference signal from the orthogonally polarized light from said sample and reference arms. As discussed below, this feature, now present in claims 23 and 42, is not found in the prior art.

In the Office Action, claims 23, 24, 27, 30, 31, 33, 35 to 38, 41 to 43, 62 and 69 were rejected as being anticipated by Imalux (EP1,253,398). Imalux also relates to optical coherence domain reflectometry. As noted by the Examiner, light from the source is directed through a beam splitter 3 into sample and reference arms. The splitter 3 also functions to recombine the light and send the combined light to a detector arm. Imalux also teaches the use of Faraday rotators 9 and 11.

It should be noted that the system in Imalux has some differences from the second embodiment of applicants' invention as recited in amended claims 23 and 42. First, splitter 3 of Imalux is a coupler with polarization discrimination but is not a polarizing beam splitting cube as shown in the Figure 7 embodiment. For optimum performance, the Imalux splitter will only be partially polarizing. For this reason, the light delivered to the detector 13 from port 12 of the Imalux splitter 3 will be different than in applicants' design. In applicants' Figure 7 embodiment, the reflected the light waves from the reference and sample arms are orthogonally polarized with respect to each other. In order to extract an interference signal, an extra polarizer is provided in the detection arm and is azimuthally oriented to cause the two polarization states to interfere with each other . Imalux does not have such a polarizer nor does it need one. Accordingly, it is respectfully submitted that amended claims 23 and 42 are neither anticipated nor rendered obvious by Imalux and allowance of those claims is respectfully requested.

In the Office Action, the Examiner rejected claims 25 and 40 based on the Imalux patent in view of Wang (6,961,123). Wang was cited for its teaching that the sample can be an eye and for the use of polarization sensitive detectors. While Wang teaches the use of two detectors following a polarization element, the remainder of the lay-out of Wang is completely different. In particular, the polarizing beam splitter (PBS 51) of Wang is located between a non-polarizing beam splitter 18 and the detectors and is simply used to separate the light via polarization discrimination. In applicants' invention, the additional polarizer 752 follows a polarizing beam splitter 714 and is used for a different purpose, specifically, to extract an interference signal from the orthogonally polarized light from said sample and reference arms.

In the Office Action, the Examiner cited the patent application to Everett (2002/0093655) in his rejection of dependent claim 26. The examiner relied on Everett for its teaching of use of either fiber optics or bulk optics. The patent to Everett is related to polarization changes in dental tissue. The teachings in Everett fail to overcome the deficiencies of the primary references in anticipating or rendering obvious amended independent claims 23 and 42 which include a polarizing beam splitter for directing light into sample and reference arms, rotating the polarization state of the light in both arms, recombining the light and guiding the recombined light to a detector and further including a polarizer located between the polarizing beam splitter and the detector and azimuthally oriented to extract an interference signal from the orthogonally polarized light from said sample and reference arms.

In the Office Action, the Examiner rejected claims 28, 32, 34 and 39 over the Imalux patent in view of applicants' admitted prior art (AAPA). The AAPA noted by the Examiner includes a detector with an optical dispersive element, polarization controllers in the source and sample arms and a dynamically controllable quarter-wave plate. As can be appreciated, none of these admitted prior art configurations address the subject matter of amended claims 23 and 42.

In the Office Action, the Examiner rejected claim 29 based on the Imalux patent in view of Izatt (2005/0036150). The Izatt patent was relied upon for its teaching of a swept source. The teachings in Izatt fail to overcome the deficiencies of the primary references in anticipating or rendering obvious amended independent claims 23 and 42 which include a polarizing beam splitter for directing light into sample and reference arms, rotating the polarization state of the light in both arms, recombining the light and guiding the recombined light to a detector and further including a polarizer located between the polarizing beam splitter and the detector and

azimuthally oriented to extract an interference signal from the orthogonally polarized light from said sample and reference arms.

Based on the above, it is respectfully submitted that all of the claims pending in the application define patentable subject matter and allowance thereof is respectfully requested.

Respectfully submitted,

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Dated: 5/31/06

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